
Flightfax
ARMY AVIATION RISK-MANAGEMENT INFORMATION
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Fratricide
Reducing Self-Inflicted Losses

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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CONTENTS

POV FATALITIES
through 30 November

FY03	FY02	3-yr Avg
17	21	16

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James E. Simmons
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Commanding

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DASAF's CORNER

from the Director of Army Safety

Managing Risks Prevents Fratricide

Each time we extend into conflict, the number of accidents goes up both in the areas of operation and in the training bases preparing to support the operation. Statistics show that we lose more soldiers to accidents than to enemy action during conflicts. In every major conflict since the Korean War, we have suffered more casualties due to accidents than to enemy action. In addition to accidents, friendly fire incidents have claimed a significant number of lives as well.

In combat operations and intensified training conditions that nearly replicate combat conditions with large numbers of armored combat vehicles operating in congested areas, convoy operations at night and often limited visibility, aviation operations, and huge numbers of personnel on the ground, the "fog of war" can result and the stage is set for friendly fire incidents. In Operation Desert Shield/Desert Storm, we experienced 12 direct-fire, 1 indirect-fire, and 2 air-to-ground fratricides, and 77 percent of our combat vehicle losses were due to fratricide. Combat identification was the number one problem.

Since Desert Shield/Desert Storm, fratricide prevention has been a point of discussion for soldiers attending leader courses. It is also a subject of great concern at our training centers. However, technological solutions for fratricide prevention have not advanced significantly in the years since Desert Shield/Desert Storm. In fact, other than schoolhouse training and development of situational awareness tools, we actually have made no measurable improvement in our ability to prevent fratricide since Desert Shield/Desert Storm.

Recognizing the need to address this potential hazard and proactively define controls to reduce its risk before we engage in future conflicts, the Chief of Staff, Army, directed a fratricide avoidance risk assessment. Data and lessons learned collected from FORSCOM units and TRADOC institutions show that we remain at high risk for fratricide incidents.

Reducing that risk requires continued education and training. Soldiers must learn to maintain situational awareness. Vehicles and individuals must be marked appropriately, and soldiers must be sufficiently trained to identify those markings. Other mitigation efforts include fielding combat identification panels or thermal identification panels on all vehicles at brigade and below. Soldiers must also master the use of global positioning systems and land navigation. We also can reduce this risk by developing a standard method for employing attack aviation in the close fight, by certifying our battalion commanders on the effects of weapons system and fire and control of direct and indirect fires.

The intent of conflict or war is to inflict harm on only those we intend to—the enemy—and not our own forces. The loss from accidents or fratricide of any of our assets greatly reduces our readiness. But when we lose soldiers due to friendly fire, this needless loss of combat power also results in a general degradation of cohesion and morale, which can cause us to lose the initiative and our aggressiveness during fire and maneuver operations. The impact can be so great that it leads to a hesitation to conduct limited visibility operations, loss of confidence in the unit's leadership, an increase in leader self-doubt, hesitation to use supporting combat systems, or even over-supervision of a unit.

As leaders charged with executing the many missions given to our Army while simultaneously protecting the men and women who so selflessly serve, it is incumbent upon us to address proactively common recurring hazards that accompany intensified training preparations and real-world missions. Fratricide is one hazard we must ensure our soldiers have been properly trained to prevent on the battlefield.

Train hard and play hard, but be safe!

BG James E. Simmons

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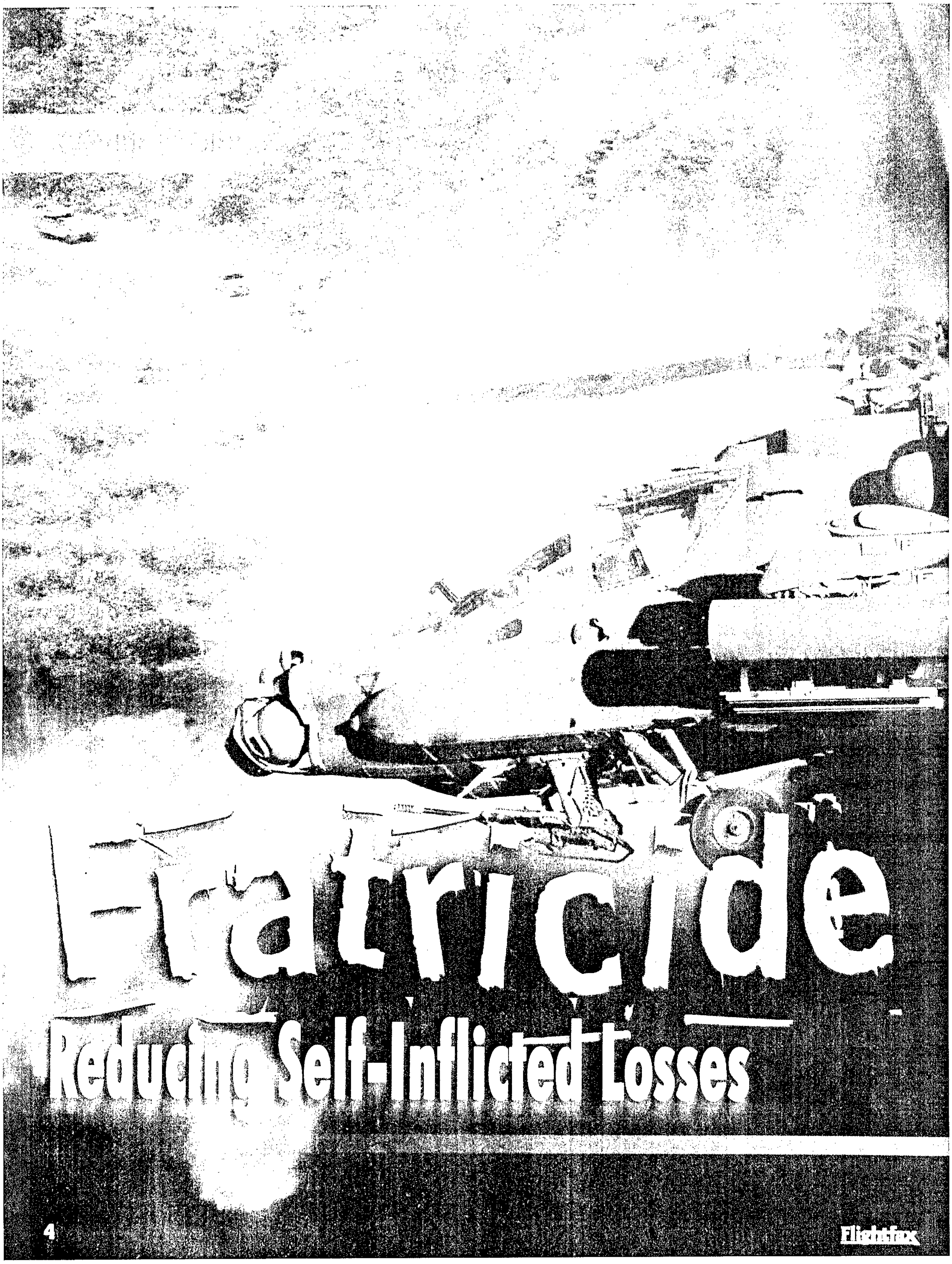

Fratricide

Reducing Self-Inflicted Losses

Webster's Ninth New Collegiate Dictionary defines fratricide as "one who murders or kills his own brother or sister...." A definition more applicable to the military was developed by the 1991 General Officer Steering Committee, "... the employment of friendly weapons and munitions with the intent to kill the enemy or destroy his equipment that results in unforeseen and unintentional death or injury to friendly personnel." Regardless of how this problem is defined, the results are catastrophic.

Fratric[illegible] a new problem. As long as [illegible] has taken up arms as part of an organization, incidents of fratricide have been present. Occurrences of fratricide are evident in all organized human conflicts, from the ancient Greek and Roman armies through our current operations in Afghanistan. As weapons have become more efficient at killing the enemy, acts of fratricide have become more common.

An untimely friendly fire accident could have catastrophic results for an individual, unit, or even an Army. Some believe the untimely death of Stonewall Jackson at Chancellorsville during the American Civil War so disturbed General Lee that his judgment was affected at Gettysburg. It's impossible to say whether this incident turned the tide against the South in the Civil War, but the loss of such an able commander no doubt had a negative impact.

Accurately measuring fratricide rates is a difficult task. Since friendly fire accidents are unpalatable, they have gone underreported; thus, there is a lack of base data, with the exception of Desert Storm, to work with. The method of counting is also an issue. According to the U.S. Army War College Quarterly, *Parameters*, our Combat Training Centers (CTCs), National Training Center (NTC), Joint Readiness Training Center (JRTC), and the Combat Maneuver Training Center (CMTC) each use different methods of documenting fratricide rates. The table on page 6, extracted from the Spring 1995 edition of *Parameters*, shows historical fratricide rates.

Causes of friendly fire

Friendly fire accidents can be grouped into three main categories: human, environmental, and technological.

■ **Human**. Human causes include a lack of training, situational awareness failures, lack of discipline, and combat stress. Training

failures include poor navigation skills, inability to proficiently operate assigned equipment, and combat vehicle identification failures to name a few.

Situational awareness must be built and maintained; it is not a given. It is built over time through education (knowing doctrine), training (practicing execution), planning, briefing, and rehearsals. Situational awareness is maintained through battle tracking and must be accomplished, as appropriate, from the individual gunner to the commander.

Disciplined execution means, among other things, making assigned times and checkpoints, accurate position reporting, and knowing and understanding the plan. Combat stress is caused by all those simple things that go wrong, piling up at once and resulting in bad decisions.

■ **Environmental**. When speaking of environmental causes of fratricide, you must expand the discussion beyond the obvious. It's easy to see how weather, darkness, terrain, and visual obscurants affect our ability to locate and identify friendly or enemy combat vehicles. How much time does one have to identify a target as it moves between buildings in a city? How do these factors affect our ability to navigate and position report? Fratricide prevention is not only the responsibility of the trigger pullers; soldiers must be where they are supposed to be when they are supposed to be there or report the difference. There is more than one example of vehicles getting lost and misreporting their position. During Desert Storm, 11 of the 13 fratricide incidents reported by the Army were attributed to environmental factors.

■ **Technology**. The Army has made great strides in the development of situational awareness tools to give the commander a digital picture of the battlefield. Aircraft have Identify Friend or Foe (IFF) systems on board and some ground vehicles are equipped with the Enhanced Position Location and Reporting System (EPLRS) radios; both are designed to identify the aircraft or vehicle as friendly. Our weapons' range and lethality has greatly outpaced our targeting sensors' ability to identify the targets we are killing. And finally, technology must be correctly maintained, operated, and used to be effective.

How do friendly fire accidents affect an

Conflict	Source of Data	Fratricide rate
World War I	**Besecker Diary (Europe)**	**10% Wounded in Action (WIA)**
World War II	**Hopkins, New Georgia** **Burma** **Bougainville Study**	**14% Total Casualties** **14% Total Casualties** **12% WIA** **16% Killed in Action (KIA)**
Korea	**25th Infantry Division**	**7% Casualties**
Vietnam	**WEDMET (autopsy)** **WEDMET (autopsy)** **WEDMET** **Hawkins**	**14% KIA (rifle)** **11% KIA (fragments)** **11% Casualties** **14% Casualties**
Just Cause	**U.S. Department of Defense**	**5-12% WIA** **13% KIA**
Desert Storm	**U.S. Department of Defense**	**15% WIA** **24% KIA**

organization? At the very least, both the victim and the organization responsible for the fire will experience morale problems. Depending on the nature of the incident, an organization may become paralyzed and hesitate to conduct limited visibility operations or to use combined arms or to maneuver, all of which will affect their effectiveness on the battlefield. Fratricide effects extend beyond the battlefield. U.S. casualty rates during recent conflicts have been so low that the public will not continue to accept a rate of fratricide that is higher than the rate of casualties produced by enemy action.

Karl Von Clausewitz wrote of the friction of war stating that, "Everything is simple in war, but the simplest thing is difficult. These difficulties accumulate and produce a friction which no man can imagine...."

What can be done to reduce the risk of fratricide? The place to start is education and training. Education includes knowing the basic soldier skills of navigation, map reading, combat vehicle identification, proper operation of assigned equipment, and effects of their personal and crew served weapons. Soldiers must be trained and drilled in the skills taught above until they are second nature. We must also become familiar with the tactics, techniques, and procedures (TTPs) of other branches within the Army and other services or coalition partners.

Along with education and training, technological control measures such as IFF systems, combat identification panels (CIPs), and tactical identification panels (TIPs) can be used to identify friendly vehicles. Situational awareness tools such as the EPLRS radio and the Army battle command system (ABCS) assist commanders in battle tracking. All current technology based systems are tools and should not be trusted implicitly. Education, training, and technology are all things we should bring to the game.

Situational awareness, on the other hand, must be gained and maintained on the battlefield. Situational awareness is gained by the commander and staff through mission planning and preparation which includes the location and disposition of units they may come in contact with. The picture gained through the planning process is communicated to the unit through mission briefings and a clear commander's intent.

The rehearsal is where individuals within the unit back brief the commander with their understanding of the situation and their part of the mission. Planning, preparation, briefing, and rehearsing are the mechanisms through which a commander builds situational awareness within an organization.

Maintaining situational awareness is the responsibility of the entire unit. Leaders must report their elements' positions and observations to maintain and continue to build these units' collective situational awareness. Situational awareness maintenance is like the homeowners' "To Do" list, never ending and ever expanding.

Finally, strict discipline must be maintained. The pace of current military operations does not allow for late position reporting or lost crews. Individuals and crews must be where they are supposed to be when they are supposed to be there, or report the difference. If they do not, they run the risk of being misidentified and targeted by friendly systems.

Karl Von Clausewitz wrote of the friction of war stating that, "Everything is simple in war, but the simplest thing is difficult. These difficulties accumulate and produce a friction which no man can imagine...." The causes of fratricide are components of Clausewitz's friction. He also wrote that this friction is countered by such means as training, planning, orders, and discipline. How effective an organization is at overcoming the friction of war and thus controlling the causes of fratricide are directly proportional to how well the commander applies those remedies described by Clausewitz. ■

—CW5 Larry Kulsrud, Aviation Systems and Accident Investigation Division, DSN 558-2534 (334-255-2534), larry.kulsrud@safetycenter.army.mil

Too Tired To Perform?

Happy New Year from the new Command Surgeon at the U.S. Army Safety Center. I hope to be a frequent contributor to *Flightfax*. I see my job primarily as one in which I might impact safety through prevention. You, the human, are the only weapon system that increases in value over time. But your value is predicated on your training, discipline, and ability to perform at the decisive time and place.

Illness and injury can adversely affect your combat readiness. The Army wants to positively impact the health of soldiers, but when it comes to your individual health, *you* have the flight controls. The health choices you make are "at pilot's discretion," and like an air traffic controller, we will keep you informed and up to date with medical PIREPS, but you must choose wisely in order to remain healthy and in the cockpit, on the hangar floor, or on the flightline, being all you can be!

Now that you are rested up from a nice Christmas break, I'd like to discuss a medical readiness issue that is epidemic in today's society: lack of sleep. Everywhere I go, I see people living lives at a frantic pace. Not only are they stressed trying to satisfy the myriad demands of work, home, professional and personal development, but many people are pathologically tired. This can be a killer! How many *Flightfax* readers have prided themselves in working a full duty day, then taking off and driving 9 hours to see that special someone, or ski (or fish or sail or hunt)? We "pull all-nighters" getting that last minute briefing or report out, then strut our ability to perform without sleeping as a badge of honor. Benjamin Franklin was right about a lot of things. Death and taxes are unavoidable, and so is sleep. Perhaps that is why he stressed the "early to bed, early to rise" recipe for a healthy and prosperous life.

We have all felt fatigued after a particularly arduous effort, but we do not always recognize the insidious onset of the dulling effect that sleep deprivation can have on our mental abilities. Fatigue can cause even "Pentium 4" caliber intellect to function at a "386" speed.

How many commanders and primary staff officers have you observed walking around like zombies on the third day of a field problem? By the time the second live-fire exercise begins, the entire TOC can be decremented 20 IQ points! This mental decline can be ruinous in the aviation environment, making for bad decisions in and out of the aircraft.

Sleep is unavoidable, and is as basic to survival as food and water. The loss of only two hours of sleep can adversely affect alertness and performance. While most soldiers are able to compensate for one night's acute sleep loss, going several days without adequate sleep causes one to accumulate a "sleep debt," which can be potentially catastrophic when the debtor comes calling.

Sleep deprivation affects an aviator's attention to detail and ability to respond to an emergency. How many of us depend on that little "adrenaline surge" we get after we doze off while driving? That boost is short-lived, and followed

by rebound drowsiness. Symptoms of sleep deprivation include poor judgment, impaired decision-making and memory, inappropriate reaction time, decreased concentration, visual fixation and worsened mood. Perhaps that grouch sitting next to you in the cockpit is actually sleep deprived, not a malcontent.

What do the following disasters all have in common? Three Mile Island. Chernobyl. Exxon Valdez. They all occurred during the night shift when operators were fatigued and vigilance was impaired.

Consider fratricide (see page 4) as well. An inordinate number of fratricide incidents occur at night when the decision-making abilities of both the shooter and the victim are decremented. Studies of brain activity and performance have repeatedly demonstrated that sleep deprivation not only impairs high-level, executive thinking, but that one-in-five shift workers doze off during the shift. Afterwards, many of them do not even realize they have done so. It is little wonder General Jackson was hit by sleep-deprived friendlies with excitable reaction times!

Sleep is unavoidable, and is as basic to survival as food and water. Your body needs 8 hours of sleep per night. Eight hours! Every night!

Research at the U.S. Army Aeromedical Research Lab has shown that aviators flying a UH-60 simulator doze off for up to three seconds before they realize they had done so. How much can happen in three seconds when you are traveling 120 knots at a "comfortable" 200 feet AGL?

Another recent study has equated acute sleep deprivation with the consumption of two beers. While two beers will not intoxicate the average aviator, performance is so universally impaired that it would be unthinkable to show up at the flight-line after downing two beers in the Lizard Lounge. Yet we routinely report to fly acutely fatigued.

So what is to be done about this epidemic lack of sleep? There is no free lunch. Your body needs 8 hours of sleep per night. Eight hours! Every night! This is an unfunded mandate, sound familiar? Watch less T.V. Accept the fact that you can't know everything. Does it really matter who Brad or Jennifer or J-Lo are dating? It isn't you! Go to bed.

Ideally you should wake up without an alarm, refreshed after 8 hours of cortical re-programming. If you go to bed early enough, you can train yourself to get up without an alarm; Ben Franklin did! Do not use alcohol to help you get to sleep. It will destroy your sleep architecture and interrupt your REM sleep. That's why you feel so terrible the morning after (well, it's one of the reasons).

Exercise more, but not late in the day, and avoid caffeine after dinner or even after lunch if you are sensitive to its effects. Avoid turning your bedroom into an office. Don't read or watch T.V. in bed, it ruins your sleep hygiene.

The bottom line is that you need to be as disciplined about sleep as you are about checking your E-mail and going to the gym. Your job requires you to be vigilant. You are not in college. Dozing-off in English Lit after staying up until 0200 is one thing; forgetting a tool, skipping a pre-flight step, or dozing-off in flight can be catastrophic. It is critical that you get the sleep you need. Others depend on you, and besides, if you don't take care of your body, where else are you going to live? ■

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Editor's note: *In 1997, the U.S. Army Aeromedical Research Lab and the U.S. Army Safety Center jointly published the Leaders Guide to Crew Endurance. This classic publication is available online, and nicely articulates the problems with acute and chronic fatigue, sleep hygiene and circadian desynchronosis or maladaptation* ***(http://safety.army.mil/home.html)****. Future articles in Flightfax will discuss these and other sleep-related topics.*

Aircrew Coordination Training (ACT) Challenge

The two-man crew of the AH-64 was conducting a regimental Deep Attack. The pilot (PI), CW2 Smith, was a little nervous, having only 300 hours in this aircraft, but he was very aware that his instructor pilot (IP), CW3 Jones, had over 2,000 hours of flight time and was highly respected in the unit.

CW2 Smith was on the controls while they were en route. The IP asked the PI to make a radio call while he was busy using the TADS. The PI assumed the IP wanted to take the controls as the radio frequency was not pre-set. The PI released the controls and focused his attention on the radio, which left no one flying the aircraft. The aircraft descended into the trees at 90 KTS. The IP was fatally injured and the $12M aircraft was destroyed.

The results of the accident review board were conclusive. Crew coordination error, specifically on the part of the IP, was the direct cause of this accident. CW3 Jones lost situational awareness by assuming that the PI could continue to control the aircraft while attempting to change radio frequencies. But there was a deeper, more disturbing element present here as well. Assumptions not spoken can often result in failures.

Aircrew coordination training defined

The Army defines aircrew coordination as a set of principles, attitudes, procedures, and techniques that transforms individuals into an effective crew. The stated objective of aircrew coordination training (ACT) is to provide aircrews the knowledge, skills, and attitudes necessary to increase their mission effectiveness while decreasing errors that lead to accidents.

Aircrew coordination training

The Army initially implemented the ACT program in 1992. As a result of this program, Army aircrews learned behavioral skills and team coordination techniques that helped them to remain focused and ready to deal with emergencies and unforeseen problems. Therefore, they were able to better concentrate on mission objectives. Commanders and aircrews alike acknowledged the benefit of the mandatory, one-time training that was received by all aviators within the Army Aviation community.

Unfortunately, the initial program did not address sustainment issues and did not package the training in a program that would facilitate such training. Further, significant personnel turbulence associated with downsizing the force has resulted in a natural erosion of the safety gains initially realized as a result of ACT.

Regrettably, the atrophying of skills and experience levels that has occurred during successive years of limited Defense funding have now manifested themselves in a sharp increase in accident and incident rates.

Current issues

Lack of effective aircrew coordination continues to be cited as a contributing factor in flight accidents, and it is a factor limiting attainment of the full-mission effectiveness of Army Aviation. The Director of Army Safety reported in the December 1999 issue of *Flightfax* that FY99 produced Army Aviation's worst safety performance since Desert Shield/Desert Storm. FY02 was even worse than FY99. Currently, ACT is conducted in the classroom with no follow-on mandatory training periods in either aircraft simulators or in the aircraft.

Temporary measures such as awareness

videos, assistance visits, safety newsletter articles, and a web-based training support package have had limited success, but are ineffective substitutes for focused aircrew coordination training. A recent look at 18 months of Class A through C accidents clearly indicated some 45 percent of all mishaps had crew coordination errors.

Aircrew coordination training enhancement (ACTE) research

The Army Research Institute (ARI), through its Rotary-wing Aviation Research Unit located at Fort Rucker, Alabama, manages a program of applied research structured in three major phases: upgrade and sustain the existing ACT program, refresh and maintain the upgraded ACT program, and deploy advanced ACT applications.

ARI receives research assistance from the Aircrew Coordination Working Group (ACWG). The ACWG, formed in 1999, is composed of designated representatives from the U.S. Army Aviation Center and Fort Rucker, the U.S. Army Safety Center, and the Army National Guard. The ACWG provides subject matter experts (SMEs) who are knowledgeable and experienced in aircrew coordination training, standards and evaluation, safety and human factors, as well as uniquely qualified to review measures, methods, and training materials included in the prototype ACTE courses.

A recent look at 18 months of Class A through C accidents clearly indicated some 45 percent of all mishaps had crew coordination errors.

The objective of the ACT research effort is to improve the crew and team coordination effectiveness of Army aircrews in their day-to-day mission planning and flight operations. The enhanced ACT program builds on the original exportable training package, revitalizing it from a one-time training event and enhancing it to a dynamic, relevant program that is continuously updated and improved.

Establishing and maintaining a unit-level command climate that promotes the use of team coordination behaviors will realize this objective and place equal emphasis on technical and team coordination skills in daily flight operations. Instructor pilots and ACT facilitators in aviation units are key to the institutionalization of a successful ACT program.

What can you do?

While the research is being completed and programs are being developed, here's what Army aircrew members can do:

- Review the Crew Coordination section of your ATM.
- Analyze your own crew briefing, in-flight and post-mission procedures; do they cover crew coordination adequately?
- Review approved materials such as the crew coordination student handout you received in flight school or a copy of the Crew Coordination Exportable Training Package (ETP) available from your unit standardization officer.
- Do our unit SOPs and training plans cover ACT and are crew coordination issues relevant to our METL? How do we capture ACT-related incidents?
- Do we allow time for effective pre- and post-mission briefings?
- Do we ensure crews utilize the recording systems in the aircraft and simulator on all missions?
- When was the last time a crewmember in our unit failed an evaluation due to improper crew coordination?

The proper employment of aircrew coordination helps to mitigate errors, thereby reducing the potential for an accident. Research also indicates a 20-percent improvement in mission effectiveness in crews that utilize crew coordination. The only way that the two-man crew in the downed Apache is going to fly with the experience of a 2,300-hour crew (a 2,000-hour IP and a 300-hour PI) is through the use of *effective crew coordination*.

If you are interested in having your unit participate in future ACT-related research projects, contact Dr. Larry Katz at the Army Research Institute at katzl@rwaru.army.mil. ■

—Bob Giffin, USASC Systems Safety Manager and a member of the ACWG, DSN 558-3650 (334-255-3650), Robert.Giffin@safetycenter.army.mil

Refractive Surgery for Army Aviation

Will refractive surgery ever be allowed within Army Aviation? This is a question that researchers at the U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, Alabama, are busy trying to answer.

Each year, it seems that more and more refractive surgeries are being performed in the civilian world. Many people like the idea of not having to depend on spectacles or contact lenses to see 20/20 or better. Because of this trend, more applicants to flight school and current aviation personnel are considering refractive surgeries. USAARL is currently researching two procedures: laser in-situ keratomileuses (LASIK) and photorefractive keratectomy (PRK) for Army Aviation.

There are three populations of interest to the research of refractive surgery in the Army Aviation realm. The combination of these studies allows a broad, comprehensive look at how refractive surgery could impact Army Aviation.

Accession

Many flight school applicants have the potential to be excellent pilots, but are disqualified because their vision is outside of standards or because they have had refractive surgery. Flight school applicants can enter the "Evaluation of Refractive Surgery for Army Aviation" study. This study allows flight school hopefuls the chance to become candidates for flight school by granting exceptions to policy for post-PRK or post-LASIK applicants that meet study parameters. Vision must be the only flying duty medical examination (FDME) disqualifier in order for the application process to continue, and applying to this study does not guarantee a flight school slot. Applicants must still compete for a slot with other qualified applicants.

This is a four-year study that looks at the parameters of how refractive surgery might affect initial entry rotary wing (IERW) students. The study will include 100 LASIK, 100 PRK, and 100 Control subjects. They have to be between the ages of 18 to 35 and be at least 3 months post-operative. The subjects' surgical correction must not have been greater than six diopters of myopia correction, four diopters of hyperopia correction, and/or three diopters of astigmatism correction. Corrected visual acuity must be within Class 1W/1A FDME standards and the cornea must be free of haze. Other considerations, such as low contrast visual acuity, are thoroughly examined by researchers at USAARL before an exception to policy will be granted.

Upon graduation from flight school, the subjects' flight records are examined so a complete assessment of their performance can be made, as well as all of his vision health and acuity examinations.

Rated aviator

Active Army, rated and current, aviators are included in the two-year "Operational Assessment of Refractive Surgery for Rated Army Aviators: A Prospective Evaluation" study.

This study monitors the possible changes in vision and flight performance of rated aviators after refractive surgery. To qualify, one must be 22-50 years old, active duty (Title 10 or 32 USC), FAC 1 or 2 proficient, RL 1 or 2, NVG experienced, with a prescription greater than –0.75 diopters of near-sightedness or +2.00 diopters of far-sightedness. Qualified pilots visit USAARL for a preoperative exam and an initial flight in USAARL's JUH-60A aircraft and full motion UH-60 simulator. The subjects then travel to Walter

Reed Army Medical Center (WRAMC) for their refractive surgery procedure which is included as part of the study. They return to USAARL after one week post-surgery to be evaluated with vision exams and a flight in the simulator.

From this point, the subjects will only return to USAARL for a one-month, six-month and twelve-month post operative exams so more in-flight data and visual acuity data can be collected. All trips to USAARL are paid with normal temporary duty (TDY) procedures. The subjects are expected to return to their normal duty station flight duties within one to three months postoperative after being cleared by USAARL and a designated flight surgeon.

The response to the Rated Aviator study has been great, but one question seems to keep surfacing: *"Why are only UH-60 pilots being allowed to participate?"* The answer lies within the equipment being used to collect the in-flight data for the study. USAARL has possession of a JUH-60A that is fully equipped with an on-board computer system that monitors in-flight pilot performance data, such as drift from desired flight course. There is not another system available like this that can be utilized for the collection of real-time, in-flight data in any other aircraft platform at the present time.

It is expected that the results of this study will eventually be applicable across all platforms. The results will be provided to the Aeromedical community, Aviation Branch, and the U.S. Army Surgeon General for policy decisions.

CRSSP

Non-pilot aviation personnel can apply for the "Corneal Refractive Surgery Surveillance Program" (CRSSP). The CRSSP is looking at non-pilot aviation personnel and how refractive surgery may affect this area of Army Aviation. This program includes flight surgeons, flight medics, crew chiefs, air traffic controllers, and other crewmembers.

The CRSSP is governed by an Aeromedical Policy Letter (APL). Individuals who have had refractive surgery or wish to have surgery must follow the guidelines in the APL in order to qualify for a waiver. The best way to proceed is through the supporting flight surgeon's office. Six weeks after surgery, if visual acuity has stabilized and all other vision concerns meet FDME standards, the subject may receive a waiver to continue their normal flight duties. After receiving a waiver, a regular yearly FDME eye exam is completed at their normal duty station and USAARL is sent the results. This allows monitoring of any changes in performance and/or vision parameters that may occur post-operatively.

What's ahead?

USAARL hopes to have an answer to whether refractive surgery has a place in Army Aviation within the next few years. These three different protocols will give an accurate and thorough report on how safe refractive vision procedures are for the Army's unique flight conditions. Low-level rotary-wing flight introduces many things that can affect visual acuity such as dust and haze. Throw in decreased light levels such as in night flights or night vision goggle (NVG) flights, and a pilot and his crew have an array of visually demanding parameters that calls for healthy, consistent eyesight. This fuels the demand for accurate, field-tested data that answers the questions set forth by the aviation community concerning the value of refractive surgery. ■

—LTC Corina van de Pol, USAARL, 334-255-6876 or Jon "Bo" Sawyer, USAARL, 334-255-6980, www.usaarl.army.mil.

If you would like more information on these programs, contact the USAARL Refractive Surgery Study Team at 334-255-6875/6809/6810

WAR Stories

Engine Flameout – 45 Seconds to Initial Impact

We were scheduled for a 2-hour data collection flight in the TH-6B, a half-hour longer than the typical syllabus sortie at the U.S. Navy Test Pilot School, but still comfortably within the endurance of the aircraft. During the flight brief, a bingo fuel of 100 pounds was established to ensure the aircraft was back on deck by the SOP minimum of 50 pounds.

During preflight checks, we noted a full indication on the fuel quantity using battery power. Due to the longer nature of our flight, we continually monitored the fuel indicator, reassured by a fuel level consistent with the mission profile. However, as the fuel level dropped below 200 pounds, the quantity indicator began to fluctuate ±20 pounds during flight maneuvers. A sensitive instrumentation fuel gauge was also installed in the aircraft that indicated gallons-used. As a backup to the ship's gauge, we calculated a bingo of 42 gallons used (100 pounds remaining) and decided to head back at the first indication of bingo.

At 1.8 hours into the flight, we turned back to base with 150 pounds remaining on the ship's gauge and 39.2 gallons used on the sensitive gauge. As I initiated an 80 KIAS descent from 2,000 feet AGL, the engine suddenly began to spool down. Surprised by the engine out audio warning, we both immediately checked the throttle position to ensure it was full open.

We sat dumbfounded for what seemed an eternity in denial of the fact that the engine had just quit on us. The PC called "Rotor RPM decreasing" as the needle swung to the low end of the green arc. I finally realized the engine failure, lowered the collective, and initiated an autorotation. After lowering the collective, the rotor RPM climbed to 104 percent.

The PC called "High rotor speed," and confirmed I set a collective correction. The collective setting was maintained throughout the descent until the flare. The whine of the transmission helped us monitor rotor RPM while keeping our scan outside the aircraft.

As we attempted to determine why the engine stopped, we checked the fuel gauge and noticed it was still indicating 150 pounds remaining. We considered an engine restart, but decided there wasn't enough time and focused on finding a landing site. I recall thinking, "I can't believe how fast we're descending."

After checking the throttle, the PC immediately made a MAYDAY call, and then selected the transponder to emergency and locked our shoulder harnesses. I quickly began to evaluate the surrounding fields for a suitable landing site. I considered four fields in the

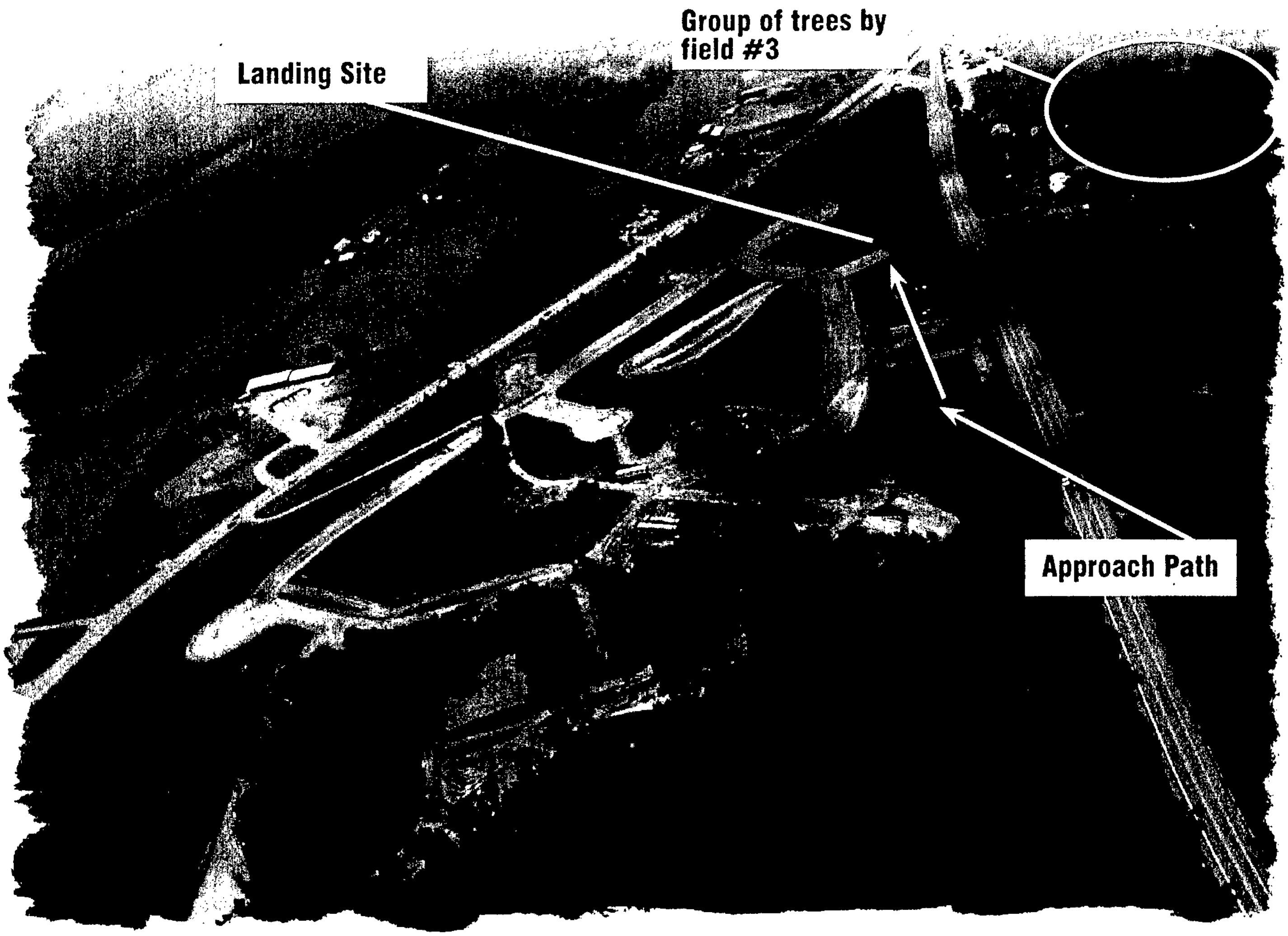
short descent and initially chose a large open farmer's field with fairly level terrain. I started a turn towards that field then realized the aircraft would impact a group of trees just short of the field. I could remember thinking, "We're going to hit the trees and die if I try to make that field."

The PC considered an S-turn or 360 to use some energy to remain within the field to his left as I turned to another field. I was finally committed to a field being developed for a housing area that had construction equipment, dirt roads, and drainage ditches.

I wasn't sure of the ground conditions, so I elected to make a zero ground speed touchdown autorotation. The only clear path seemed to be along the right side of the field next to a busy road. I wasn't sure how much distance down the field it would take to bleed off airspeed and the remaining altitude during the flare, but we were now committed to that flight path.

I glanced at the far end of the field and the group of trees thinking, "I hope we don't use the whole field trying to stop." As we crossed the edge of the field, I initiated a progressive flare, reducing airspeed and the high descent rate. By now, I was totally focused outside the aircraft looking at the intended landing area. As the rotor speed increased, the PC announced "High Nr" and I adjusted the collective to arrest the rapidly increasing rotor speed.

Approximately half-way across the field as airspeed slowed to zero and altitude closed to about 5 to 10 feet AGL, I leveled the aircraft and pulled all remaining collective until it hit the upper stop. What a sinking feeling it was to now realize we were along for the ride and could no longer influence the outcome of our little event.



As the knee-high weeds below the aircraft parted under what was left of the rotor wash, I thought to myself, "This is going to hurt." We fell about 3 to 7 feet, bounced up once, and landed about a foot over to the right from the original touchdown point.

As the aircraft hit the ground, the PC and I could feel the jolt of the impact go up our spine. I sat there for a few seconds after touchdown watching the rotor blades turn slowly, still holding the collective in the full-up position, thankful to be alive.

I looked over at the PC for the first time since the whole event started and noticed he seemed to be just fine. The PC completed the emergency engine shutdown procedures and continued to talk to a sister ship circling overhead, letting them know we were down safe. It was a weird sensation standing outside the aircraft; our skin was tingling and we were still in denial of the whole event. Faces of concern soon turned to smiles and high fives. We had lived through it!

A few minutes later, I turned the aircraft battery on again and checked the fuel. It now read zero and the low-level fuel light was illuminated. We later learned that a faulty fuel level sensing unit and associated wiring was causing erroneous fuel indications that resulted in the aircraft not being fully fueled at start-up. The fuel system design is such that the low fuel light is also driven by the same fuel sensing unit.

It took the teamwork of two pilots to do exactly what was supposed to be done and what they had been trained to do. Although we never expected something like this would happen to us (you always think it only happens to the other guy), we had just lived through it.

Lessons Learned

■ Although no one flies around continuously evaluating fields for emergency landings, you can improve your chances of survival by flying as much as possible over suitable landing areas. On that day, we were doing our testing in an area noted for its many fields. A few miles further and we would have been in a heavily wooded area with most probably a totally different outcome.

■ Practice autorotations at various airspeeds with turns to final. You just might need to use that max glide airspeed and do some turning to reach a field. The descent rates can be significantly higher than practice autorotations while the engines are still coupled to the rotor system.

■ You will probably spend a few seconds in denial trying to figure out what just happened.

■ The biggest help during the emergency was the copilot taking care of the radio calls, shoulder harnesses, transponder, and *calling out instrument indications* (rotor speed) so that I could focus outside the aircraft and concentrate on finding a suitable landing area and executing the autorotation.

■ During the flight briefing, think through the emergency plans, as well as talk about immediate actions and division of cockpit duties.

■ Landing along a road provided quick access to a phone, police, and HELP. ■

Editor's note: *Special thanks go to these two pilots who endured this accident. These men deserve a lot of credit and praise for their heroic airmanship that day. The pilots in this story are CW3 Gregg Deetman, U.S. Army (deetmanga@navair.navy.mil) and LT John Schultz, U.S. Navy (schultzjp@navair.navy.mil). They are both attached to the U.S. Navy Test Pilot School at Patuxent River, Maryland.*

Let's share... In Army Aviation, we can't afford to learn every lesson firsthand. We must learn from each others' experience whenever we can and share what we know with each other. Send your war stories and other lessons learned to flightfax@safetycenter.army.mil or call Ms. Paula Allman at DSN 558-9855 (334-255-9855).

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

AH-64

A Model

■ Class D: While in refuel and at 100%, aircrew heard loud grinding noise from the transmission area and refuel personnel noticed smoke coming from the transmission compartment. Pilot-in-command (PC) directed copilot to egress aircraft while PC performed emergency shutdown. Investigation of auxiliary power unit (APU) and transmission revealed that a small fire had occurred in the APU compartment and around the power-take-off clutch area.

D Model

■ Class A: Crew was conducting night gunnery familiarization training. Crew reported inbound to tower that they were returning to the FARP to download ammo. Aircraft crashed en route, fatally injuring the crew and destroying the aircraft. Investigation is ongoing.

■ Class B: Crew was on an approved low level multi-ship screening mission. The acft struck a small set of wires that were not marked on the map causing damage to one main rotor blade, two broken antennas, as well as damage to the ALQ144 and possible arcing on one wing.

CH-47

D Model

■ Class E: During cruise flight at 200 feet AGL (6,500 MSL), a loud whine was heard. The pilot on the controls initiated a decent. Seconds later, the #1 FLT HYD caution light illuminated. The aircraft landed with no further incident.

■ Class E: During cruise flight, the #1 & #2 beep trim switches became inoperable. Acft landed and was shutdown without further incident. Replaced N2 actuators.

■ Class E: During cruise flight at 600 feet AGL and 140 knots on a maintenance test flight, aircraft struck a bird. A small dent was found on post-flight inspection. No other damage to the aircraft was noted.

MH-60

L Model

■ Class C: Two main rotor blades contacted a small pine tree during confined area operations. Sudden stoppage inspection ongoing.

OH-58

C Model

■ Class C (Aircraft Ground): During the first start of the day, the student pilot depressed the starter and opened the throttle to flight idle at the appropriate N1 speed. As TOT approached 600-700 degrees, the IP heard an unusual sound coming from the engine area and instructed the student pilot to abort the start. During the aborted start procedures, the TOT reached 1,000 degrees. The aircraft was shutdown without further incident.

■ Class D: Suspected overtorque up to 110% for two seconds during GCA climbout. Aircraft immediately landed on airfield and flight terminated.

■ Class E: During hover, excessive play in collective controls. Acft was shutdown without further incident. Replaced tachometer generator.

DR Model

■ Class C: Student was receiving training on Manual FADEC operations. With the student on the controls, they switched to manual control on downwind. The RPM stabilized and then rose to 105-106%. The IP reduced throttle, the aircraft began to vibrate, and the engine oversped to 120%, at which point the IP entered autorotation. The aircraft landed hard upslope in soft terrain, rocked forward and back on the skids, with no ground slide. Skids were spread, right chin bubble broken, two antennas broken, and one main rotor blade had repairable damage.

TH-67

A Model

■ Class D: During the termination phase of a standard autoroatation, the aircraft touched down unlevel with excessive aft cyclic. This resulted in low rotor RPM and loud knocks were heard in the rear of the aircraft. The aircraft was shutdown and inspected by maintenance. Maintenance discovered evidence of spike knock and repaired aircraft.

UH-60

A Model

■ Class A: During NVG continuity and RL progression training, the acft struck the side of a mountain, fatally injuring all five crewmembers. Acft was discovered during SAR efforts after having been reported overdue. Investigation is ongoing.

■ Class B: During confined area operations in a whiteout condition, the crew experienced a tree strike, resulting in damage to the acft main rotor blades.

Note: For more information on selected accident briefs, call DSN 558-9552 (334-255-9552). Information published in this section is based on preliminary mishap reports submitted by units and is subject to change.

NCO CORNER

One Moment Can Affect a Lifetime

As we begin a new year, it is only fitting that we pause for a moment to reflect on the 198 soldiers that were killed in accidents over the last 12 months. One hundred ninety-eight of our people are gone forever. Our soldiers are our most precious resource; we can and must do better. We can't afford not to.

We owe it to our soldiers and we owe it to the people of this great Nation that we are sworn to protect. Our citizens send us their sons and daughters in good faith, confident that we will train them and protect them to the best of our ability. How can we justify losing even one of our soldiers to a needless accident that could have been prevented? How can we explain that loss to a grieving parent, a young widow, or to a child that can't understand why their mother or father isn't coming home?

While it may seem strange, good intentions are a common factor in Army accidents. Accidents are not caused by evil people; they are caused by people just like us that are merely trying to accomplish their daily tasks, on and off duty. Frequently they are doing things that many of us also have done before—we were just lucky enough to get away with it. The fatigued soldier speeding to get home over a long weekend; the motivated troop trying to "make it happen" in the face of inadequate time, training, or information; the operator or mechanic taking the maintenance shortcut that "never caused a problem before." These are just some of the examples that have led to disaster for our soldiers. These were great people trying to do great things but failing to properly identify, assess, and control the hazards, whether through inattention, overconfidence, indiscipline, or a simple lack of knowledge.

One thing that always has distinguished our Army from that of other nations is our ability to take initiative and make things happen. In the absence of proper supervision and effective training, this positive trait can actually work against us in the accident prevention arena. Do not discourage initiative; it is a vital part of what gives us the ability to fight and win wars. Encourage initiative and ensure we have provided our soldiers with the tools required to accomplish their tasks properly and safely.

Soldiers are adults with adult responsibilities and a serious mission. Let them stand on their own two feet, give them responsibility that is commensurate with their rank and maturity, but never relax your guard. That young soldier is squared away and has the best of intentions, but he or she does not have the experience you have.

Increase their responsibilities as they grow, but continue to provide leadership and mentorship so they can rise to your level of expertise and continue the tradition by leading and mentoring their own soldiers. Gaining experience is a continual process. Some lessons come easy and others are painful. We learn and grow by trying new things and often by making mistakes. Let your soldiers learn from the mistakes you may have made and the lessons you have learned so they do not have to relearn the things that we already have discovered the hard way.

The profession of arms is inherently dangerous and will never be truly safe. We must continue to conduct hard, realistic training. The old adage still rings true: "Better to sweat in peace than bleed in war." We must effectively manage risks by ensuring that the benefits to be gained outweigh the risks, controls are in place to reduce or eliminate

the risks, and that decisions are made at the appropriate level.

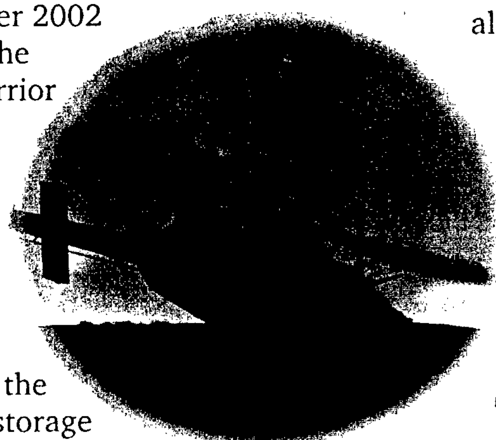
Build positive habits on duty that your soldiers will transfer to off-duty activities. Never miss an opportunity to emphasize safety or make an on-the-spot correction. Supervise and enforce the standards in all tasks. Mission accomplishment and welfare of the troops are simultaneous tasks that are interdependent upon each other. One moment can affect a lifetime. Talk to your soldiers and make them believe it. You may just save a life. ■

POC: MSG Sean O'Brian, Risk Management Integration Division, DSN 558-2845 (334-255-2845), sean.obrian@safetycenter.army.mil

NEWS & notes

Storage of Pilot Equipment

In their 10-11 December 2002 meeting, the Kiowa Warrior System Safety Working Group (SSWG) discussed an open hazard on the improper storage of pilot equipment. They made note of a recent Class E mishap in which there was an in-flight DC generator failure due to a ground wire being detached by items placed in that area of the avionics section. Improper storage of pilot equipment can also cause wire chaffing and fire.



Crews are reminded that the Operator's Manual contains cautions stating that "Cargo shall not be placed in avionics compartment" and "To prevent damage to electrical components, all equipment placed in aft electrical compartment shall be clear of electrical components and properly secured." ■

—Mr. Ron Boyce, SAIC, SFAE-AV-AS-ASH-T, DSN 645-9702 (256-955-9702), ron.boyce@redstone.army.mil

YAW KICK

In their 10-11 December 2002 meeting, the Kiowa Warrior System Safety Working Group (SSWG) opened a hazard on "yaw kick." During introduction of CDS4, there have been incidents of "yaw kick" on the ground, in which the aircraft yawed during engine shutdown/deceleration. The rapid deployment gear, because of its smaller footprint, is particularly susceptible.

In the follow-on investigation, the condition could be reproduced to a lesser degree on CDS3 aircraft. In either case, pedal positioning minimizes yaw kick during throttle reductions. The phenomenon has been attributed to an interaction between SCAS and the FADEC deceleration schedule; a fix is forthcoming in CDS4 Phase IIB, next August.

In the interim, Operator's Manual urgent change 4, 29 November 2002, cautions that "With YAW SCAS engaged during ground run operations, the potential for an uncommanded LEFT YAW exists during throttle reductions. YAW SCAS must be OFF for all throttle reductions." Also, as units receive CDS4, they are being briefed on the potential hazard. ■

—Mr. Ron Boyce, SAIC, SFAE-AV-AS-ASH-T, DSN 645-9702 (256-955-9702), ron.boyce@redstone.army.mil

We should all bear one thing in mind when we talk about a troop who ‘rode one in.’

He called upon the sum of all his knowledge and made a judgment. He believed in it so strongly that he knowingly bet his life on it.

That he was mistaken in his judgment is a tragedy, not stupidity.

Every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgment, so a little bit of all of us goes in with every troop we lose.